

TROPICAL STORM IAN (11W)

I. HIGHLIGHTS

Ian formed at the end of the monsoon trough and then moved on a north-northwestward track while embedded within the peripheral southerly flow on the eastern side of the very large Super Typhoon Herb (10W). The initial warnings on Ian were based primarily on synoptic reports from the islands of Guam and Saipan because the circulation was poorly organized on satellite imagery.

II. TRACK AND INTENSITY

During the final week of July, Super Typhoon Herb (10W) grew in size and came to dominate much of the flow of the WNP. On 27 July, a large area of deep convection became established in the monsoon flow to the south and east of Herb (Figure 3-11-1). The possibility of tropical cyclogenesis occurring in association with this area of deep convection was first mentioned on the 271800Z Significant Tropical Weather Advisory. Comments on this advisory included:

"... An area of convection is located [southeast of Guam] ... within the monsoon trough. Sounding data from Guam indicates falling heights throughout the lower troposphere. Additionally, northerly winds at Guam suggest a circulation center southeast of the island. As Typhoon Herb moves westward, this region becomes an increasingly favorable genesis area ..."

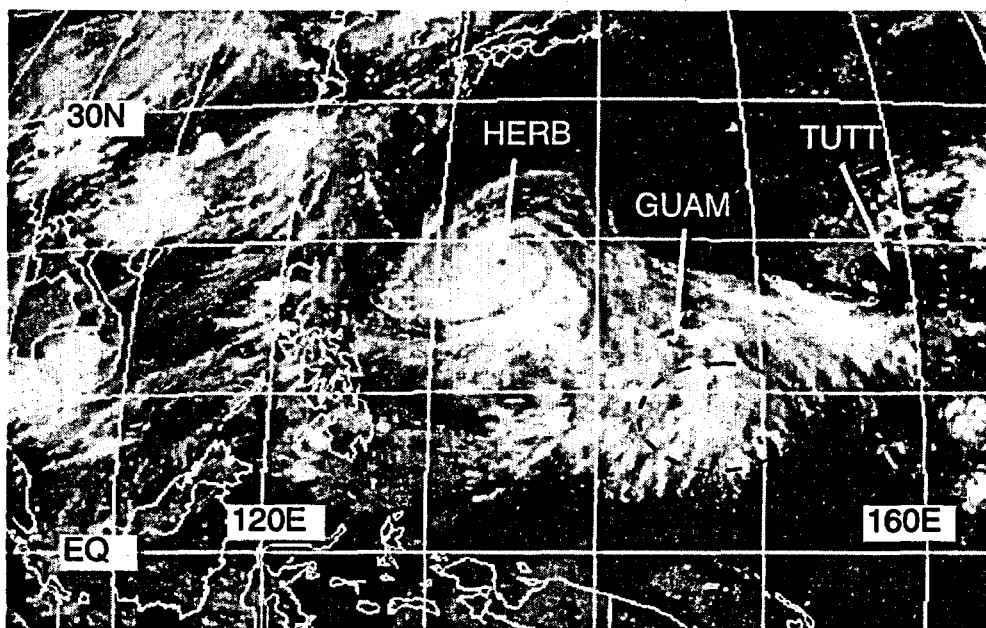


Figure 3-11-1 A large ensemble of mesoscale convective systems develops in monsoon flow to the southeast of Herb (dashed circular area) (271331Z July infrared GMS imagery).

Based upon reports of increasing winds and falling pressures on Guam and Saipan, a Tropical Cyclone Formation Alert was issued valid at 280430Z. The circulation center was then estimated to have been approximately 50 nm (90 km) to the west of Guam, and drifting slowly northward. Later that day, two ships moored at Saipan reported to the JTWC that they were experiencing gales and had to put to sea. Based upon these ship reports, and from high winds (20 to 30 kt) and low pressure (1003 mb) experienced on Guam and Saipan, the first warning on Tropical Depression (TD) 11W was released valid at 281200Z. When an area of persistent deep convection became established near the estimated center location, TD 11W was upgraded to Tropical Storm Ian on the warning valid at 290000Z. In post analysis, based upon data recorded in the logs of the

aforementioned ships which had to depart Saipan, and upon indications on microwave imagery (Figure 3-11-2) that the organization of the deep convection was better than indicated on conventional visible (Figure 3-11-3) and infrared satellite imagery, TD 11W was increased to a tropical storm at 280000Z.

On 29 July, a third TC — TD 12W formed within a TUTT cell to the northeast of Ian (see Joy's (12W) summary and figure 3-11-1) to create a reverse-oriented monsoon trough that stretched northeastward from Herb (10W). Embedded in this trough, and also embedded in the large circulation of Herb (10W), Ian moved northward, as anticipated. Strong upper-level northwesterly winds, which were part of Herb's extensive outflow, exerted shear on Ian, and the system failed to mature. Instead, the low-level circulation center (LLCC) became displaced to the north of Ian's deep convection, and the system was downgraded to a tropical depression on the warning valid at 300600Z. On 31 July, deep convection was completely sheared away from Ian's LLCC, and the final warning was issued valid at 310600Z as the exposed LLCC slowly dissipated over water to the south of Japan.

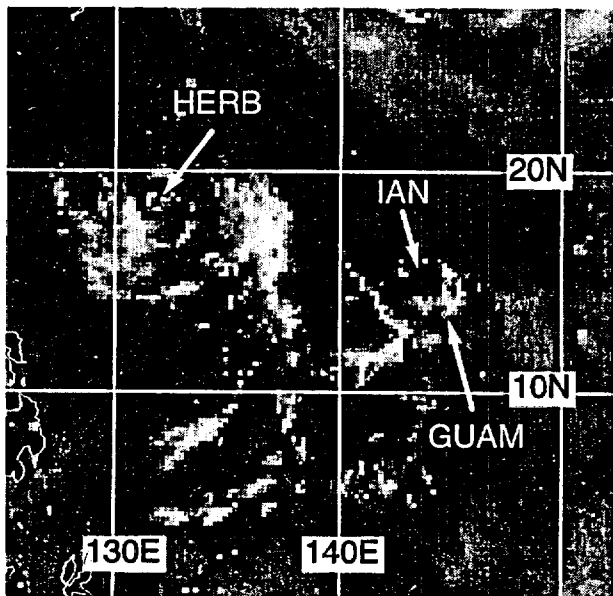
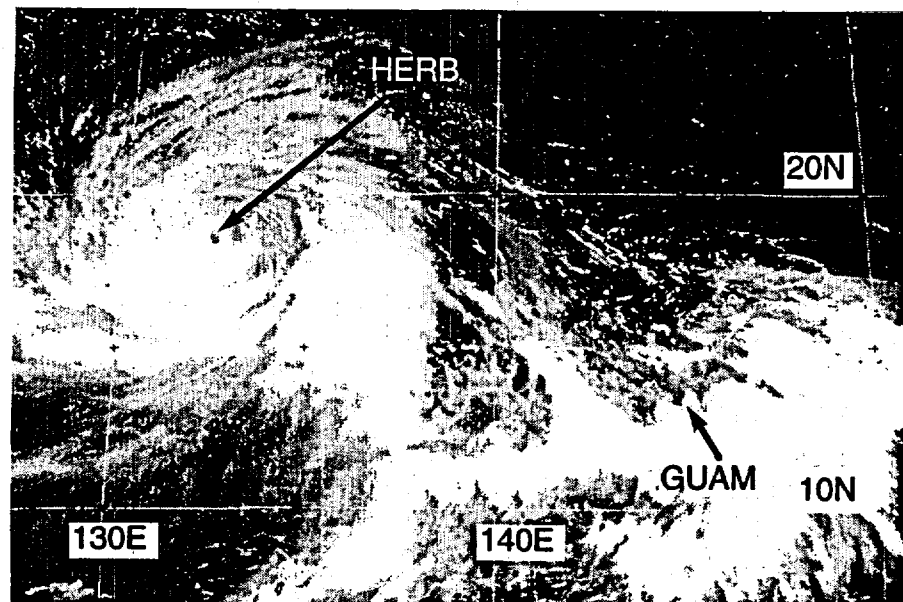


Figure 3-11-2 Deep convection associated with Ian is organized into cyclonically-curved bands (280914Z July 85 GHz microwave DMSP imagery).

Figure 3-11-3 Although the deep convection appears to be poorly organized, a low pressure area associated with over-water gales has developed near Guam and Saipan. In post analysis, Ian became a tropical storm at this time (272331Z July visible GMS imagery).



III. DISCUSSION

a. Unusual structure

As Ian moved northward in a cyclonically-curved track around the eastern periphery of the larger circulation of Herb (10W), it was often difficult to establish whether it was an independent cyclonic circulation, vice a cusp or a wave. Synoptic data indicated for most of its life, Ian took the form of a cusp, with a region of gales on its eastern side and a zero velocity singularity at the center (or at most, a very small region of northerly winds on its western side) (Figure 3-11-4). When Ian passed Guam and Saipan, it was at first thought the high winds were associated with a surge (or squall line) in the monsoon. The drop of pressure to 1003 mb at its closest point of approach, the day-long duration of high wind, and a subsequent 24-hour pressure rise of 8 mb in 24 hours at Guam, however, were more consistent with the passage of a tropical cyclone.

b. Ian as a "satellite" of Herb (10W)

Occasionally, small TCs are observed to develop in the peripheral flow of very large TCs in the WNP. These small TCs tend to be weak, have short life spans, and are advected around the larger TC. These small TCs which form and orbit in the peripheral flow of very large TCs will herein be called "satellite" TCs, based upon the astronomical analogy of a small object (i.e., a satellite) in orbit of a much larger object. Very large TCs in recent years which have had smaller "satellite" TCs in their peripheral circulation include Abby (1983) which had two "satellites" (Ben and Carmen), and Hal (1988) which also had two "satellites" (Jeff and Irma). Ian was a "satellite" TC of the very large Herb (10W), and was closely analogous with respect to its cloud signature and relative position to Hal's "satellite", Irma (1988).

IV. IMPACT

Much of the northern half of Saipan lost power when high winds associated with Ian caused power lines to short out against tree branches. Some similar spot power outages occurred on Guam. Also on Saipan, some ships at anchor were forced to put to sea. No other reports of significant damage or injuries attributable to Ian were received by the JTWC.

Figure 3-11-4
Ian, which is embedded within the strong southerly flow on the eastern side of Herb, is difficult to "close-off" (290000Z July NOGAPS sea-level pressure analysis).

